

**Amateur-Professional Cooperation:
Lessons Learned From the International Halley Watch
1981-1989**

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The International Halley Watch (IHW) was a focused coordination effort to obtain the most complete collection of data ever assembled on a comet. The goal was to archive these data for use by future generations. Included from the outset were plans to collect and preserve observations by amateur astronomers (Brandt et al., 1980). As the program developed, it became apparent that a "practice" session would be valuable. Comet P/Crommelin served this purpose in 1983-4 (Sekanina and Aronsson, 1985). The IHW expanded its efforts to include Comet P/Giacobini-Zinner when it was decided to re-direct the International Sun-Earth Explorer 3 spacecraft to fly through the tail of that comet during its 1985 apparition. (The spacecraft was renamed the International Cometary Explorer when its new objective was determined.)

The IHW advocated observations made by any valid scientific means. It served to coordinate observations among groundbased astronomical disciplines and with spacecraft measurements. As much as possible, observations were standardized. All the data were archived and are available as a set of 24 CD-ROMs, with two additional CD-ROMs of spacecraft data later added to the set (cf. Sekanina and Fry, 1991). In addition, printed archives of the amateur observations were published (Edberg, 1996).

With potentially huge numbers of amateur astronomers wishing to participate, a plan had to be developed that could channel, control, and direct the expected outpouring of observational enthusiasm. Edberg (1983) prepared a manual giving detailed instruction on making scientifically useful comet observations. It included a registration/observer information form, a discussion of scientific observing methods, detailed instructions for making visual magnitude estimates, drawings, photographs, spectrograms, astrometric measurements, photoelectric photometric measurements, and meteor observations. Along with the instructions, observation report forms were created and these observation forms, submitted by observers, were used for data input. In addition, a newsletter was issued periodically that kept participants informed and provided a venue for updates and requests.

Relevant statistics:

Total Registrations: 1575*

Actual Observers Supplying Archivable Data	Comet Halley	873
	Comet Giacobini-Zinner	106
	Comet Crommelin	21

*There were numerous submissions of data, especially from meteor observers, who never formally registered and are not counted here.

<u>Observations**</u>	Visual Obs'ns	Drawings	Photos	Spectra
P/Halley	11641	1309	2165	45
P/Giacobini-Zinner	1016	53	20	
P/Crommelin	199			

**Astrometric, photoelectric, and meteor observations were forwarded to the professional disciplines dealing with these data.

Note how the popularity of the target is reflected in the quantities of data that are part of the IHW amateur data archive.

LESSONS LEARNED

The IHW Amateur Observation Network dealt with a large number of observers who often submitted large amounts of data. While future professional-amateur cooperative endeavors are not likely to be as large, the many lessons learned are likely to be applicable with even a small number of observers. The IHW was organized just on the cusp of the personal computer revolution. What had to be done with paper then would today be done with electronic mail, the World Wide Web, and standardized electronic data input via spreadsheet or database methods.

Professional astronomers seeking assistance from amateur astronomers should make their plans based on the following suggestions:

1. Include leading amateur astronomers in your initial planning. Thoroughly plan all aspects of the collaboration, from the initial announcement and invitation to the publication of results.
2. Write instructions clearly and concisely. Include rationales, even for "obvious" things, and for the "don't do's".
3. Supply explicit standards and calibrations and insist on their use.
4. Provide a data report form or method. This will save considerable effort in collecting and collating the data.
5. Have a registration form that has required fields and includes apparently redundant information (e.g., instrument aperture, focal length, and focal ratio are redundant, but such information and other information like it may help you sort out a confusing data report).
6. From the onset, make sure everyone understands data rights and co-authorship requirements.
7. Maintain contact with your collaborators for the duration of the program. Keep them informed of ongoing status. Issue a final report.
8. Allocate time for "handholding". Your collaborators are saving you immense amounts of observing time, but may need more guidance than you realize.
9. Be prepared for the unexpected. When dealing with a collection of individuals of widely different backgrounds, there will be surprises.
10. Respect your collaborators - they are professionals in their own fields.

Amateur astronomers who wish to assist professional astronomers in their research should be prepared to do the following:

1. Fill out the registration form completely. Your professional collaborator needs the information requested.
2. READ the material the investigator sends you. It will provide information you need for a fruitful collaboration.
3. Follow directions. There are good reasons for them. Don't invalidate your work and waste your time and the investigator's time.
4. Provide data in the manner requested and be complete.
5. Respect your professional collaborator. E knows what E's doing.

RECOMMENDATIONS

At the October 1998 meeting of AAS Division for Planetary Sciences a workshop explored possible avenues of professional-amateur collaboration. One suggestion was the establishment of a World Wide Web site for the registration of amateur and professional astronomers wishing to collaborate. Such a database should include the following:

Professional Listing

Name

Address

E-mail address

Web page URL

Investigation title

Keywords

Abstract

Summary
References

Observation requirements (telescope size, detector, filters, measurement cycles & frequency, overall time commitment)

Data type

Data processing requirements

Data delivery mode

Copyright/publication/archival rights and permissions

Comments/Notes

The corresponding database for amateur astronomers should include the following:

Amateur Listing

Name

Address

E-mail address

Web page URL

Observing site list, including longitude, latitude, altitude, and naked eye limiting magnitude for all primary observing sites (i.e., wherever permanently-mounted or portable telescopes are used)

Telescope list including aperture, focal length, and focal ratio, with correspondence to the site list (it is helpful to know which telescope[s] are used where)

Detector list (eye, photography, electronic imaging, etc.)

Accessory details (filters, gratings, etc.)

Data processing hardware and software

Typical availability for observing: for an ongoing observing program, what frequency and what duration can your observing sessions be?

Other instrumentation available

Areas of participation/interest

Level of experience (categorized by area of participation)

Desired copyright/publication/archival rights and permissions

Comments/Notes

CONCLUSION

The collaboration of professional and amateur astronomers on research projects can be very fruitful and satisfying for all participants. It requires work, understanding, and good will from everyone. Amateur astronomers are an under-utilized resource that can bring greater enjoyment and enthusiasm, as well as lots of quality data, to research collaborations. Hopefully the number of collaborations will grow with time, with advances in astronomy proceeding apace.

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